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Inventory of Sources with Emissions of 25 to 100 Tons per Year Subject to Organic Material Regulations in Metropolitan Boston AQCR

Engineering-Science, Inc., McLean, VA

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An inventory of volatile organic compound emissions was conducted for sources in the Metropolitan Boston AQCR. Potential sources were identified using existing emissions data from the Massachusetts Department of Environmental Quality Engineering and from the U.S. EPA, Region I; Dun and Bradstreet industrial listings; and a listing of industrial concerns supplied by the Massachusetts Department of Employment Security. Potential sources were identified by four-digit SIC. Questionnaires were mailed to the selected sources. The returned questionnaires were reviewed, and emissions were estimated. The results were quantified in an inventory of sources with the potential to emit between 25 and 100 tons/year.

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INVENTORY OF SOURCES WITH EMISSIONS OF 25 TO 100 TONS PER YEAR SUBJECT TO ORGANIC MATERIAL REGULATIONS IN METROPOLITAN BOSTON AQCR

Prepared for

U. S. Environmental Protection Agency
Division of Stationary Source Enforcement
Washington, D. C. 20460

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CHAPTER I

INTRODUCTION

In response to the Clean Air Act Amendments (CAAA) of 1977 the Metropolitan Boston AQCR has been designated as a nonattainment area for ozone. As a result, the Massachusetts Department of Environmental Quality Engineering (DEQE) must submmit a revision of their State Imlementation Plan (SIP) to the U. S. Environmental Protection Agency (EPA). The SIP revision must demonstrate attainment of the primary National Ambient Air Quality Standards (NAAQS) by 1982; however, in the case of ozone and carbon monoxide, Congress recognized the difficulty that areas with problems related to these two pollutants would have in demonstrating attainment by 1982. As a result the CAAA contain a provision for a five year extension to 1987 to enable the problem areas further time to comply. The revised plans are required by the CAAA to impose measures representing reasonable available control technology (RACT) on stationary sources and transportation strategies for mobile sources (such as inspection and maintenance). These levels of control must take cost and other factors into account.

The attainment of the oxidant NAAQS will be more difficult than attainment of the NAAQSs for other pollutants. No source emits oxidants. Rather, oxidants result from complex atmospheric photochemical reactions involving VOCs, oxides of nitrogen, and other compounds. The current control philosophy is to reduce oxidant concentrations by reducing emissions of two precursors: VOCs and oxides of nitrogen. VOC emission reduction is the primary element in this strategy. Since the 1977 Clean Air Act Amendments require a State Implementation Plan (SIP) revision for areas which have failed to attain an NAAQS, the SIP revision for the Metropolitan Boston AQCR will, doubtless, contain VOC emission reduction requirements.

The first step in preparing a SIP revision is to inventory the emission sources of the pollutant which is of concern. The Massachusetts Department of Environmental Quality Engineering (DEQE) and Region I of the EPA have embarked upon a comprehensive program to develop a SIP revision for attainment

of the oxidant NAAQS in the Metropolitan Boston Intrastate AQCR. Engineering-Science (ES) assisted the DEQE in this effort by performing an inventory of the point sources within the AQCR with potential emissions of 25-100 tons per year.

After ES completed this inventory of the sources in the Metropolitan Boston AQCR which have a potential emission rate of 25 to 100 tons per year the information was used to update the Compliance Data System (CDS) files. This will enable DEQE and EPA to effectively track the compliance status of point sources and to plan enforcement activities.

This report presents a discussion of the procedures followed by ES in the inventory of the Boston AQCR VOC point sources. Specifically, Chapter II outlines the methodologies utilized in identifying and surveying potential sources. Chapter III gives an analysis of how the emissions levels were estimated. Chapter IV shows a summary of the results from this study, and Chapter V presents an analysis of existing VOC regulations and their applicability to this study.

CHAPTER II

SURVEYING METHODOLOGY

The most common technique used for gathering emission inventory data is probably the mail survey. The primary purpose of this mail survey was to obtain source and emission data by means of a questionnaire mailed to each facility. In order to conduct this type of data gathering operation efficiently, the facilities to be surveyed were identified; mailing lists prepared; questionnaires had to be designed, assembled and mailed; data handling procedures were prepared and organized; and response receiving systems established. The steps performed to accomplish these tasks are presented in the following discussion.

IDENTIFYING POTENTIAL SOURCES

A common problem in developing VOC inventories through the use of mail surveys is that there are a large number of potential VOC sources which would not normally be reported if the inventory effort were not specifically directed towards VOC emissions. As a result a number of data lists which provided potential sources were surveyed in an effort to identify all the applicable sources. These data lists include: (1) the existing emissions inventory in the National Emissions Data System (NEDS); (2) the current Compliance Data System (CDS) master file; (3) a listing from the Massachusetts Department of Employment Security (DES); and (4) the Dun and Bradstreet industrial directory. A common feature of each of these lists is that potential sources can be identified on the basis of their Standard Industrial Classificastion (SIC) codes. These lists can be used in coordination with Table II-1 to identify potential VOC sources. As can be seen from reviewing the table, types of sources of

TABLE II-1[1]

STANDARD INDUSTRIAL CLASSIFICATIONS (SICs) AND
EMISSIONS-PER-EMPLOYEE ASSOCIATED WITH VOC EMISSIONS

GENERAL 2-DIGIT SIC CATEGORIES		SPECIFIC 4-DIGIT SIC CATEGORIES	EMISSION-PER-EMPLOYEE RANGES (tons/employee/yr)
20	Food	Alcoholic beverages (2085)	0.075
21	Tobacco	Not Surveyed	-
22	Textiles	Coatings (2295), Non-wovens (2297), Dyeing (2231)	0.563-0.89
23	Apparel	Not Surveyed	-
24	Lumber & wood	Finished product (2435), (2492)	0.024-0.07
25	Furniture & fixtures	SIC (2511), (2514), (2521), (2522), (25242	0.08 -0.24
26	Paper	Bags, box (2643), (2651), (2653), Coated papers (2641)	1.0 -1.25
27	Printing	Newspaper publishing (2711) Comm. printing (2751), (2754)	0.08 -0.5
28	Chemicals	Organic chemical mfg. (2821), (2823), (2861), Chemical coating (2851), Specialty chemicals (2842), Carbon black (2895)	0.32 -0.357
29	Petroleum	All companies	0.11 -2.12
30	Rubber, plastic	Footwear (3021), Plastics (3041), (3069)	0.16 -0.256
31	Leather	Mfg. shoes (3149), Bags (3161), Personal goods (3172), Leather refinishing (3111)	0.13
32	Stone, clay, etc.	Glass products (3221)	0.03 -0.092
33	Primary metal	Treating (3398), Tubing (3357)	0.10 -0.267

[1] From Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume I (EPA-450/2-77-028).

TABLE II-1[1] (cont.)

STANDARD INDUSTRIAL CLASSIFICATIONS (SICs) AND
EMISSIONS-PER-EMPLOYEE ASSOCIATED WITH VOC EMISSIONS

GENERAL 2-DIGIT SIC CATEGORIES		SPECIFIC 4-DIGIT SIC CATEGORIES	EMISSION-PER-EMPLOYEE RANGES (tons/employee/yr)
34	Fab. metal	Screws (3451-2), Metal samplings (3469), Plating (3471), Tool mfg. (3423), (3429)	0.19 -0.281
35	Machinery	Industrial machines	0.03 -0.048
36	Elect. Machinery	Devices (3643), Semicond. (3674)	0.04 -0.07
37	Transpt. equip.	Boats (3732), Truck bodies (3711), (13, 14, 15)	0.11 -0.855
38	Instruments	Optical frames (3832) Precision instruments (3825)	0.04 -0.199
39	Misc. Mfg.	Jewelry (3914-15), Toys (3944), Writing instr. (3951,53)	0.07 -0.259
5171	Bulk terminals	All surveyed	-
7216	Dry cleaning	All surveyed	-

1 From Procedures for the Preparation of Emission Inventories for Volatile Organic Compounds, Volume I (EPA-450/2-77-028).

VOC emissions are listed according to SIC. As a result potential VOC sources were identified by direct comparison of the SICs listed in Table II-1 with the industrial SIC listings.

After all the potential sources were identified further refinement was necessary to limit the facilities surveyed to those with potential emissions of 25 to 100 tons per year. This reduction was accomplished by two means. The first was by reviewing the permit and registration files for information that was already available. The second method of limiting the survey was to estimate a plant's emissions by using the emission-per-employee figures which are listed in Table II-1. In addition to these measures, the sources which DEQE had previously evaluated were omitted from the ES survey. A copy of the final mailing list is contained in Appendix A.

QUESTIONNNAIRES

The questionnaires utilized for this mail survey were designed principally by DEQE, with a few minor suggestions from Engineering-Science. A copy of the form is contained in Appendix B.

RESPONSE AND RECONTACTING

After the survey packages which consisted of cover letter, instructions and questionnaire, were labeled for each of the facilities on the mailing list the assemblage was mailed to each plant. In some cases a response was not received after a reasonable time lapse which necessitated recontacting nonresponding plants. Recontacting was also necesssary in cases where further information was needed to supplement the data that had been supplied on the returned questionnaire. Due to time constraints the recontacting was done by phone in lieu of attempting to remail another survey package. By the end of this study ES was able to obtain responses from approximately 90% of the facilities originally on the mailing list.

TABLE III-1

COMMON CHEMICALS AND THEIR DENSITIES

SOLVENT	DENSITY (lbs/gal)	SOLVENT	DENSITY (lbs/gal)
Acetone	6.59	MIBK	6.68
Alcohol	6.76	Mineral Spirits	6.4
2 Butanone	6.71	Naptha	7.31
Butyl Acetate	7.35	Ortho Dichloro Benzene	10.89
Butyl Cellosolve	7.4	Paint	13.0
Cellosolve	7.8	Perchloroethylene	13.47
Cellosolve Acetate	8.13	Pine Oil	7.17
Creosote Oil	8.92	Polyurethane	9.2
Enamel	8.1	Primer	11.0
Ethanol	6.61	Stoddard	6.38
Ethyl Acetate	7.51	Styrene	7.56
Freon	12.48	Thinner	7.2
Hexane	5.53	Toluene	7.26
Isopropyl Acetate	7.4	Trichloroethylene	12.47
Isopropyl Alcohol	6.55	Varnish	10.2
Kerosene	6.84	Varsol	6.4
Lacquer	8.6	VMP	7.0
Lactol (Nathal) Spirits	6.13	Xylene	7.23
Metaxylol	7.2	Xylol	7.2
Methanol	6.63		
Methylene Chloride	11.12		
Methyl Ethyl Ketone (MEK)	6.71		

There are four general VOC source categories which were considered during the course of this study; they are:

- o gasoline and crude oil storage;
- o gasoline marketing - bulk plants and terminals;
- o surface coating; and
- o degreasing.

Due to the generality of these categories further delineation is useful.

GASOLINE AND CRUDE OIL STORAGE

The petroleum and chemical process industries include many operations. Petroleum production, refining, chemical manufacturing, transportation, marketing, and consumption all require the storage of volatile organic liquids. Storage tanks for volatile organic liquids can be sources of evaporative emissions; and, as a result, the EPA has formulated guidelines to cover the storage of gasoline.

GASOLINE MARKETING

The Gasoline Marketing-Bulk Plants and Terminals category includes tank truck, rail car, and marine vessel seaport terminals in addition to bulk plants. Terminals are located at the end of pipelines, or near refineries and chemical plants for the loading and unloading of crude oil, petroleum products, and organic chemicals. Bulk plants are secondary distribution facilities receiving product by tank truck or rail car and redistributing it by smaller tank trucks. Equipment located at terminals and bulk plants include storage tanks, pumps, valves, and loading arms and hoses. The major portion of the emissions from this category are from storage tanks and loading operations. In addition to the emissions from bulk plants and terminals, there are also significant emissions produced by filling underground storage tanks at gasoline service stations, referred to as Stage I. The vapor balance controls used for this type of source are similar to the control technology utilized for tank truck and tank car unloading.

SURFACE COATING

According to the American Society for Testing and Materials, a surface coating is "a liquid, liquifiable, or mastic composition with is converted to a solid protective, decorative or adherent film after application as a thin layer". The various types of surface coatings include: paints, varnishes, lacquers, stains, shellacs, polymer films, waxes, and oils. These coatings are applied to metal, paper, fabric, wood, glass, stone, concrete, plastic, and other types of surfaces. Table III-2 further details the various products which are subject to the Control Technology Guidelines (CTG). Emissions are a result of evaporation of volatile organic compounds during the application and drying of the coating.

DEGREASING

Degreasing or solvent metal cleaning employs nonaqueous solvents to remove soils from the surface of metal articles which are to be electroplated, painted, repaired, inspected, assembled, or further machined. Metal workpieces are cleaned with organic solvents because water or detergent solutions exhibit a slow drying rate, electrical conductivity, high surface tension, a tendency to cause rusting, and a relatively low solubility for organic soils such as greases. A broad spectrum of organic solvents is available, such as petroleum distillates, chlorinated hydrocarbons, ketones and alcohols. Although solvents may vary, there are basically three types of degreasers: cold cleaners, open top vapor degreasers, and conveyorized degreasers. Emissions are due primarily to evaporation, carry-out and disposal.

ACTUAL AND POTENTIAL EMISSIONS

This study deals with two types of emissions, actual and potential. Actual emissions were defined as the existing level of emissions from a source based on process constituents and the present level of activity. Potential emissions represent an analysis of 'worst case' conditions. Potential emissions are estimated by projecting the actual emission rate to 24-hour continuous daily operation every day of the year with no source control equipment.

TABLE III-2

C.T.G. CATEGORY DEFINITIONS OF COATED PRODUCTS

CATEGORY	PRODUCT(S)
Automobiles and Light Duty Trucks	Automobiles include all passenger cars or passenger car derivatives capable of seating 12 or fewer passengers. Light Duty Trucks include any motor vehicles rated at 8,500 pounds gross vehicle weight or less designed primarily for purposes of transporation of property or are derivatives of such vehicles e.g., pick-ups, vans, and window vans.
Cans	Metal containers used for storage of anything from beverages, meats, fruit, vegetables and other edible products to tennis balls, motor oil and paints.
Coils	Any flat metal sheet or strip that comes in rolls or coils. Finished products are cans, appliances, roof decks, shelving, industrial and residential siding, cameras, culvert stock, cars, gutters, etc.
Paper	Decorative and functional paper products such as adhesive tapes and labels; decorated, coated and glazed paper; book covers; office copier paper (zinc oxide coated); carbon paper; typewriter ribbons; and photographic film.
Fabrics	Textile substrate like industrial and electrical tapes, tire cord, utility meter seals, imitation leathers, tarpauline, shoe materials and upholstery fabrics.
Metal Furniture	Falls under the two categories of (1) business and institutional and (2) household. Includes tables, chairs, waste baskets, beds, desks, lockers, benches, shelving, file cabinets, lamps, room dividers and similar products.
Large Appliances	Includes doors, cases, lids, panels and interior support parts of residential and commercial washers, dryers, ranges, refrigerators, freezers, water heaters, dish washers, trash compactors, air conditioners and other similar products.
Magnetic Wire Insulation	Aluminum or copper wire used in such equipment as electrical motors, generators and transformers to produce an electromagnetic field.

CHAPTER IV

SUMMARY OF EMISSIONS

This chapter presents the facilities that have been identified as having potential emissions of 25 to 100 tons per year. It should be noted that all of these sources were not found exclusively through this survey. Some of the sources were identified by the original DEQE survey that preceded the initiation of this project. The third source of information was an emission inventory directed towards facilities with a potential emission rate of 100 tons per year or greater, which was performed by ES for EPA.

The emissions from 50 plants that were identified are presented in the following tables. Table IV-1 presents each plants actual and potential emissions. In addition this table also presents information on the type of activities which generate VOC emissions within the plant and what control equipment, if any, is utilized. Table IV-2 aggregates the potential emissions from the individual plants according to VOC type category, and Table IV-3 similarly summarizes the estimated actual emissions.

TABLE IV-1

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Abington							
Acton	Beacon Publishing Co. 20 South Main St	2711	90	Graphic Arts	9	38	None
Arlington							
Ashland							
Avon	Waldoroth Label Corp 60 Bodwell St	2641	120	Graphic Arts	15	72	None
Bedford							
Belmont							
Beverly	Beverly Times Dunham Road	2711	55	Graphic Arts	21	75	None
Beverly	Ventron Corp Congress St	2819	150	Textile Polymers	16	30	None
Bolton							
Boston	Armstrong Lab Div (ATI Inc)	2844	200	Organic Chem Mfg	55	80	None
Boston	Bethlehem Steel Corp (Boston Yard) 256 Marginal St	3731	500	Other Metal Products (Ships)	27	57	None

TABLE IV-1 (cont.)

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Boston	Cadillac Paint 156 Western Ave	2851	25	Paint Mfg	7	32	None
Boston	Christian Science Publ 1 Norway St	2711	750	Graphic Arts	8	36	None
Boston	Colourpicture Publ 76 Atherton St	2752	170	Graphic Arts	24	99	None
Boston	Honeywell 38 Life St	3573	1500	Degreasing, Other Metal	64 1	93 2	None None
Boston	Mark-Burton, Inc 300 Summer St	2752	85	Graphic Arts	16	33	None
Boston	Royal Label Co 80 Freeport St	2641	30	Graphic Arts	6	26	None
Boston	Westinghouse Damon St	3564	645	Other Metal Products, Degreasing	24 2	50 3	None
Boxborough							
Braintree							
Bridgewater							
Brockton	Maaco Auto Painting (APS Inc) 123 Belmont St	7535	11	Automobiles	11	47	None
Brookline							

TABLE IV-1 (cont.)

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Burlington							
Cambridge	Advent Corp 167 Albany	3651		Plastic Products	5	26	Carbon Absorption 80%
Cambridge	Fenton Shoe 129 Franklin St	3143	400	Adhesives	10	46	None
Cambridge	Hyde Athletic Ind 432 Columbia	3149	225	Adhesives	6	27	None
Cambridge	TRW Carr Division 195 Binney St	3964	220	Degreasing	59	92	None
Canton	Emerson & Cuming 869 Washington St	2821	100	Plastic Products	9	26	None
Chelsea	American Biltrite Co 22 Willow St	3069	370	Plastic Products	18	40	None
Cohasset							
Danvers							
Dedham							
Dover							
Duxbury							
East Bridgewater							

TABLE IV-1 (cont.)

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Easton							
Essex							
Everett	Daniels Printing Co 40 Commercial St	2751	120	Graphic Arts	19	43	None
Everett	Duncan Galvanizing	3479	30	Other Metal	9	37	None
Everett	Kyanize Paints Inc 2nd & Boston Sts PO Box 133	2851	78	Paint Mfg	18	94	None
Framingham	Granet Division ESB Inc 25 Loring Dr	3079	70	Fabric Coating	18	39	None
Gloucester							
Hamilton							
Hanover							
Hanson							
Hingham							
Holbrook							
Holliston							
Hopkinton							
Hudson							
Hull							
Ipswich							
Lexington	Craft Cleaners 1707 Massachusetts Ave	7216		Dry Cleaning	19	52	None

TABLE IV-1 (cont.)

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Lincoln							
Lynn							
Lynnfield							
Malden							
Manchester							
Marblehead							
Marlborough	Butcher Polish Co 120 Bartlett	2842	40	Organic Chem. Manufacture, Degreasing	6 1	27 1	None None
Marlborough	Digital Equipment Corp 200 Forest St	3573	2250	Degreasing, Other Metal Products	4 3	18 14	None None
Marshfield							
Maynard	Data Terminal Systems 124 Acton St	3643	275	Degreasing	8	32	Condensing Coil
Medfield							
Medford	Acme Printing Co 4 Colby St	2751	170	Graphic Arts	19	43	None
Melrose							
Middleton	Bostik Div USM Boston St	2891	150	Organic Chem	34	47	None

TABLE IV-1 (cont.)

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Millis							
Milton							
Nahant							
Natick							
Needham							
Newton	Holly Cleaners Inc 1314 Center St	7216	23	Dry Cleaning	7	29	None
Newton	St. Regis Paper 156 Oak St	2641	375	Paper	63	93	None
Norfolk							
North Reading							
Norwell							
Norwood	Richard A. Klein Inc 349 Lenox St	2542	90	Degreasing, Other Metal Products	11 11	25 24	None None
Peabody							
Pembroke							
Quincy							
Randolph							
Reading							
Revere							
Rockland	ET Wright & Co 379 Liberty St	3149	300	Other (Shoes) Adhesives	10 4	44 18	None None

TABLE IV-1 (cont.)

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Rockland	Transworld Adhesive & Chemical Corp Air Station Industrial Park	2891	65	Organic Chem	18	40	None
Rockport Salem	EG & G Inc 35 Congress St	3679	440	Degreasing	11	45	None
Salem	Maynard Plastics 49 Congress St	3079	200	Rubber Products	23	34	None
Saugus Scituate Sharon Sherborn							
Somerville	HK Porter Inc 74 Foley St	3423	235	Other Metal Products	13	58	None
Southborough Stoneham							
Stoughton	Baker Bros. Systems Engineering & Manufacturing Corp 44 Campanelli Pkwy	3471	100	Other Metal Products	6	27	None
Stow Sudbury Swampscott Topsfield							

TABLE IV-1 (cont.)

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Wakefield	Fraen Corp 338 Main St	3469	80	Other Metal Products,	7	33	None
				Degreasing	3	60	Condensing Coils
Walpole	Bird Machine Co Neponset St	3569	350	Other Metals	23	35	None
Walpole	Bird & Son Inc Washington St	2952	180	Paper	14	35	None
Waltham	Jarrell-Ash Div Fisher Scientific 590 Lincoln ST	3832	250	Other Metal	10	63	None
Waltham	Raytheon Co 20 Seyon St	3679	2500	Other Metal Products,	9	13	None
				Degreasing	24	33	None
Waltham	Wal-Lex Cleaners 874 Lexington	7216	14	Dry Cleaning	16	71	None
Watertown	Unitrode Corp 580 Pleasant St	3674	540	Degreasing	8	32	None
Wayland							
Wellesley							
Wenham							
W Bridgewater							
Weston							
Westwood							
Weymouth							
Whitman							

TABLE IV-1 (cont.)

METROPOLITAN BOSTON VOC SOURCES BETWEEN 25 AND 100 TPY

CITY/ TOWNSHIP	COMPANY NAME AND ADDRESS	SIC	NUMBER OF EMPLOYEES	VOC CATEGORY	ACTUAL EMISSIONS (TPY)	POTENTIAL EMISSIONS (TPY)	VOC CONTROL DEVICES
Wilmington	Compugraphic Corp 80 Industrial Way	3555	1200	Degreasing	22	95	None
Wilmington	Dynamics Research Corp 60 Concord St	3679	525	Other Metal Products,	7	39	None
				Degreasing	1	5	Condenser
Wilmington	Surface Coating 100 Eames St	2851	120	Organic Chem	20	88	None
Winchester							
Winthrop							
Woburn	Maintain Inc 22 Crane Court	2541		Metal Furniture	18	77	None

TABLE IV-2

SUMMARY OF POTENTIAL VOC EMISSIONS

SOURCE		EMISSIONS (tpy)
Storage, Transportation & Marketing of Petroleum Products	Bulk Gasoline Terminals	0
	Gasoline Bulk Plants	0
Industrial Processes	Organic Chemical Mfg.	282
	Paint Mfg.	126
	Vegetable Oil Processing	0
	Pharmaceutical Mfg.	0
	Plastics Products Mfg.	92
	Rubber Products Mfg.	34
	Textile Polymers Mfg.	30
	Others	0
Industrial Surface Coating	Large Appliances	0
	Magnet Wire	0
	Automobiles	47
	Cans	0
	Metal Coils	0
	Paper	128
	Fabric	39
	Metal Furniture	77
	Wood Furniture	0
	Flat Wood Products	0
	Other Metal Products	452
	Others	44
Other Solvent Use	Degreasing	534
	Dry Cleaning	152
	Graphic Arts	465
	Adhesives	91
	Cutback Asphalt	0
	Other Solvent Use	0
Total VOC Emissions		2,593

TABLE IV-3

SUMMARY OF ACTUAL VOC EMISSIONS

SOURCE		EMISSIONS (tpy)
Storage, Transportation & Marketing of Petroleum Products	Bulk Gasoline Terminals	0
	Gasoline Bulk Plants	0
Industrial Processes	Organic Chemical Mfg.	133
	Paint Mfg.	25
	Vegetable Oil Processing	0
	Pharmaceutical Mfg.	0
	Plastics Products Mfg.	32
	Rubber Products Mfg.	23
	Textile Polymers Mfg.	16
	Others	0
Industrial Surface Coating	Large Appliances	0
	Magnet Wire	0
	Automobiles	11
	Cans	0
	Metal Coils	0
	Paper	77
	Fabric	18
	Metal Furniture	18
	Wood Furniture	0
	Flat Wood Products	0
	Other Metal Products	150
	Others	10
Other Solvent Use	Degreasing	218
	Dry Cleaning	42
	Graphic Arts	137
	Adhesives	20
	Cutback Asphalt	0
	Other Solvent Use	0
Total VOC Emissions		930

CHAPTER V

ANALYSIS OF VOC REGULATIONS

The purpose of this chapter is to present an overview of the existing VOC regulations and their applicability to this study.

BACKGROUND

In the past most air pollution control regulations in the United States applicable to stationary VOC sources were patterned after Rule 66 of the Los Angeles County Air Pollution Control District. As a result the two major strategies for such plans were positive VOC reduction and solvent substitution. However, solvent substitution is no longer considered to be an appropriate control strategy by the EPA. A 1976 Policy Statement made by EPA emphasized that the reactivity concept was useful as an interim measure only, and would not be considered a reduction in organic emissions for the purposes of estimating attainment of the NAAQS for oxidants. This policy is the result of increased understanding of the relative degree of reactivity of various materials originally believed to be of negligible effect in the formation of photochemical oxidants. There are three factors which affect this policy statement. First, many of the VOC that previously have been designated as having low reactivity are now known to be moderately or highly reactive in urban atmospheres. Second, even compounds that are presently known to have low reactivity can form appreciable amounts of oxidant under multiday stagnation conditions such as occur during the summer in many areas. Third, some compounds of low or negligible reactivity may have other deleterious effects.

There are only four compounds which are recommended for exclusion from SIP regulations; therefore, it is not necessary that they be inventoried or controlled. These compounds are:

- o Methane
- o Ethane
- o 1,1,1 - Trichloroethane (Methyl Chloroform)
- o Trichlorotrifluoroethane (Freon 113)

When determining reductions required to meet oxidant NAAQS, these VOC should not be included in the base line inventory nor should reductions in their emissions be credited toward achievement of the NAAQS. As a result, these compounds were considered exempt from the emissions calculations for this study.

It should be noted that although the four compounds listed above are exempt from VOC regulations the latter two, methyl chloroform and Freon 113, are halogenated compounds which may cause deterioration of the earth's ultraviolet radiation shield, i.e., stratospheric ozone layer. As more information becomes available on this problem the EPA may find it necessary to control these two compounds on that basis.

CONTROL TECHNOLOGY GUIDELINES

In order to assist local governments in their analysis of appropriate positive reduction methods for VOC control the EPA has published Control Technology Guidelines (CTG) for stationary VOC sources as required by the 1977 Clean Air Act Amendments. These documents examine the constituents of each of the five major VOC categories as described in Chapter III. For each process analyzed, the documents discuss the sources of VOC emissions and suggest control methods. Table V-1 lists the schedule for issuance of the CTG documents. This schedule is important because the issuance of a CTG document covering a specific process in effect dictates the future date when the EPA will expect regulations concerning that process to become effective. Through the use of the CTG documents regulations can be formulated which reasonably address necessary VOC reductions while taking into account environmental and economic factors.

REVIEW OF BOSTON AQCR REGULATIONS

As stated in the preamble of 310CMR7.00 the purpose of the Massachuseetts air pollution control regulations is to prevent conditions of air pollution where the conditions do not exist and to facilitate abatement in cases where conditions of air pollution do exist. "They [the regulations] are designed

TABLE V-1

CONTROL TECHNIQUES GUIDELINES FOR STATIONARY SOURCES OF VOLATILE ORGANIC COMPOUNDS

SOURCE CATEGORY	RELEASE DATE
Pharmaceutical Manufacture	December, 1978
Rubber Tire Manufacture	December, 1978
Graphic Arts (Printing)	December, 1978
Petroleum Liquid Storage, Floating Roof Tanks	December, 1978
Dry Cleaning, Perchloroethylene	December, 1978
Gasoline Tank Trucks Leak Prevention	December, 1978
Architectural and Miscellaneous Coatings	1979
SBR Rubber Manufacture	1979
Service Stations, Stage II	1979
Organic Chemical Manufacture	
Process Streams[1]	1979
Fugitive (Leaks)	1979
Waste Disposal	1979
Storage and Handling	1979
Ship and Barge Transport of Gasoline and Crude Oil	1979
Wood Furniture Manufacture	1979
Large Appliance Manufacture	1977
Magnet Wire Insulation	1977
Gasoline Bulk Plants	1977
Metal Furniture Manufacture	1977
Petroleum Liquid Storage, Fixed Roof Tanks	1977
Degreasing	1977

TABLE V-1 (cont.)

CONTROL TECHNIQUES GUIDELINES FOR STATIONARY SOURCES OF VOLATILE ORGANIC COMPOUNDS

SOURCE CATEGORY	RELEASE DATE
Bulk Gasoline Terminals	1977
Petroleum Refinery Vacuum Systems, Wastewater Separators and Process Unit Turnarounds	1977
Petroleum Refinery Vacuum Systems, Wastewater Separators and Process Unit Turnarounds	1977
Cutback Asphalt Paving	1977
Surface Coating of Automobiles, Cans, Metal Coils, Paper, and Fabric Products	1977
Petroleum Refinery Fugitive Emissions (Leaks)	July, 1978
Surface Coating of Miscellaneous Metal Parts and Products	July, 1978
Vegetable Oil Processing	July, 1978
Factory Surface Coating of Flatwood Paneling	July, 1978
Service Stations, Stage I	Control Technology information has been widely distributed, available on request.[2]

[1] The CTG planned for 1979 will cover some generic or unit operations concerned with chemical manufacturing processes, e.g., air oxidation, drying, distillation.

[2] "Design Criteria for Stage I Vapor Control Systems Gasoline Stations," U.S. Environmental Protection Agency, November, 1975, and "A Study of Vapor Control Methods for Gasoline Marketing Operations: Volume I - Industry Survey and Control Techniques," U.S. Environmental Protection Agency, EPA-450/3-75-046a, April 1975.

to attain, preserve, and conserve the highest possible quality of the ambient air compatible with the needs of the society."

In addition to the Massachusetts code of regulations the Boston AQCR is also subject to regulations under Title 40 of the Code of Federal Regulations (CFR). These regulations are part of a Transportation Control Plan that was originally promulgated by the Administrator of the EPA in November of 1973. The reason for this second set of regulations is that in Massachusetts' original implementation plan in 1975 methods for meeting the oxidant and carbon monoxide standards were not provided. As a result of that omission and in accordance with the Clean Air Act EPA had to promulgate a Transportation Control Plan (TCP) for the Boston Intrastate Region.

Typical gasoline product storage and marketing control techniques, which are applicable to the Boston AQCR, are stipulated in 310CMR, Section 7.02. These controls include: submerged fill and vapor recovery methods for transfer operations, i.e., Stage I and Stage II controls; floating roof tanks, pressurized tanks, vapor recovery systems or an equivalent for tanks with a capacity of greater than 40,000 gallons used to store products with a true vapor pressure of 1.5 to 11.0 psi; pressure tank systems, vapor recovery systems or an equivalent for tanks with a capacity greater than 40,000 gallons used to store products with a true vapor pressure greater than 11 psi; and vapor recovery systems for loading racks with a daily throughput of greater than 20,000 gallons using a product with a true vapor pressure of 1.5 psi or greater.

Regulations, applicable to the Boston AQCR, regarding organic solvent use as listed in Part 52.1145 of Chapter I, Title 40 of the Code of Federal Regulations necessitate the reduction of emissions by 85% on processes subject to the regulations. In general, the applicable processes are (1) those emitting more than 15 pounds of organic material in 1 day, or more than 3 pounds in 1 hour, from any process equipment using organic solvent which comes into contact with flame or is baked, heat-cured, or heat-polymerized in the presence of oxygen; and (2) those emitting more than 40 pounds of organic material in 1 day, or more than 8 pounds in 1 hour, from any process contrivance other than described in number 1 above, or applying any solvent of high photochemical reactivity or any material containing such photochemical reactive solvent.

To put the emission levels from the organic solvent use regulations in perspective, the emissions range of 25 to 100 tons per year used for this study would represent emission rates of approximately 140 to 550 lbs. per day, 365 days per year. Needless to say this illustrates that virtually all the solvent use processes presented in this study would be subject to the regulations.

APPENDIX A

METRO BOSTON AQCR - VOC MAILING LIST

METRO BOSTON AQCR - VOC MAILING LIST

Mailing List for 25-100 ton per year sources

	NAME	SIC	ADDRESS
1.	Mr. Boston Distiller Corp.	2085	1010 Mass. Ave., Boston, Ma. 02118.
2.	Synthon Inc.	2294	167 Second Ave., Cambridge, Ma. 02141.
3.	Chelsea Industries Inc.	2295	181 Spinar Ave., Chelsea. Ma. 02150.
4.	Vulpex Inc.	2295	38 Bates Street, North Abington, Ma.02351.
5.	Flextex Corp.	2295	224 Crescent Ave., Chelsea, Ma. 02150. *
6.	Hudson Combing Co. Inc.	2297	68 Tower Street, Hundson, Ma. 01749.
7.	Early American Furniture.	2511	424 Cambridge Street, Allston, Ma. 02134.*
8.	Lounge Inc.	2512	Box 231, Brockton, Ma. 02401.
9.	Meldan Company.	2512	100 Business St., Boston, Ma. 02136.
10.	Enterprise Moakler Co.	2515	155 Second St., Cambridge, Ma. 02141.
11.	Nasco Inc.	2515	190 Everrett Ave., Chelsea, Ma. 02150.
12.	Simmon's Co.	2515	600 Mystic Valley Pkwy, Medford, Ma. 02155.
13.	Hammett, JL., Co., Inc.	2531	Hammett Place, Braintree, Ma. 02184.
14.	Curry, Frank B, Company	2541	560 Harrison Ave., Boston, Ma. 02118.
15.	Maintain Inc.	2541	22 Crane Court, Woburn, Ma. 01801.
16	Woodwork Interiors Inc.	2541	1600 VFW Parkway, Boston, Ma. 02132.
17.	Klein, Richard A., Inc.	2542	349 Lenox St., Norwood, Ma. 02062.
18.	Mercury Co., of Norwood.	2542	P.O.Box 369, Norwood, Ma. 02062.
19.	Graphic Arts Finishes Inc.	2641	32 Cambridge St., Boston, Ma. 02129.
20.	New England Ind. Supply Co.	2641	210 Broadway, Everett, Ma.02149.
21.	Royal Label Company.	2641	80 Freeport St., Boston, Ma.02122.
22.	Waldoroth Label Corp.	2641	Avon Industrial Park, Avon, Ma. 02322.
23.	Custom Bag & Cover Corp.	2643	Teed Drive, Randolph, Ma. 02368.
24.	Laminated Films and Packaging	2643	14 Walnut St., Peabody, Ma. 01960.
25.	National Steel Corp.	2643	43 Third Ave., Somerville, Ma. 02143.
26.	Ace Art Co., Inc.	2645	24 Gould St., Reading, Ma. 01867.
27.	Old Colony Co. Inc.	2645	93 Mass. Ave., Boston, Ma. 02155.
28.	M.B.Claff.	2651	506 N.Warren Ave., Brockton, Ma. 02403.
29.	American Paper Box. Co.Inc.	2651	50 Brighton St., Boston, Ma. 02129.
30.	Bay State Box Co. Inc.	2651	39 Pleasant Street, Stoneham, Ma. 02180.
31.	Bicknell & Fuller Paper Box Co. Inc.	2651	2050 Revere Beach Pkwy., Everett, Ma. 02149.

* Have not responded to DEQE Survey.

METRO BOSTON AQCR - VOC MAILING LIST/ 2

32.	Frye Corbin Box Co.	2651	41 Hudson St., Marlboro, Ma. 01752.
33.	New England Paper Box.	2651	25 Conn. St., Woburn, Ma. 01801.
34.	Packard Paper Box Co. Inc.	2651	Peabody Industrial Park, Peabody, Ma. 01960.
35.	Perkit Folding Box Corp.	2651	36 Poydras Street, Boston, Ma. 02126.
36.	Rex Paper Box Co. Inc.	2651	1 Rex Dr.,Braintree, Ma. 02184.
37.	Standard Box Co.	2651	28-38 Gerrish Ave., Chelsea, Ma.02150.
38.	Atlantic Container Corp.	2653	78 River Street, Braintree, Ma. 02184.
39.	The Continental Group	2653	70 Fawcett St., Cambridge, Ma. 02138.
40.	Mass. Container Corp.	2653	300 Cedar Hill St., Marlboro, Ma. 01752.
41.	Ross Corrugated Box Corp.	2653	130 Bradlee Street, Boston, Ma. 02136.
42.	Premier Corrugated Box Inc.	2653	Forbes Industrial Park, Chelsea, Ma.02150.
43.	Beacon Publishing Co. Inc.	2711	Main Street, South Acton, Ma. 01720.
44.	Computer World Inc. Group.	2711	797 Washington St., Newton, Ma. 02160.
45.	Enterprise Sun. Inc.	2711	250 Maple St., Marlboro, Ma. 01752.
46.	Essex County Newspapers Inc.	2711	Dunham Road, Beverly, Ma. 01915.
47.	Franklin Publishing Co. Inc.	2711	65 Grove St., Rockland, Ma. 02370.
48.	George W. Prescott Pub.	2711	Folsom St., Quincy, Ma. 02169.
49.	Harvard Advocate Trustees Inc.	2711	21 South St., Cambridge, Ma. 02138.
50.	Hastings & Sons Pub. Co.	2711	38 Exchange St., Lynn, Ma. 01901.
51.	Malden Publications Inc.	2711	277 Commercial St., Malden, Va. 02148.
52.	North Shore Weeklies Inc.	2711	10 Union St., Ipswich, Ma. 01938.
53.	Real Paper Inc.	2711	929 Mass. Ave., Cambridge, Ma. 02138.
54.	Salem News Publishing Co. Inc.	2711	155 Washington St., Salem, Ma. 01970.
55.	South Shore Publishing Co. Inc.	2711	777 County Way, North Scituste, Ma. 02060.
56.	Transcript Newspapers Inc.	2711	420 Washington St., Dedham, Ma. 02026.
57.	Waltham Publishing Co.	2711	18 Pine St., Waltham, Ma. 02154.
58.	Babsons Reports Inc.	2721	370 Washington St., Wellesley, Ma. 02181.
59.	Benwill Publishing Corp.	2721	167 Corey Road, Boston, Ma. 02135.
60.	Computer World Inc.	2721	797 Washington St., Newton, Ma. 02160.
61.	General Birch Services.	2721	395 Concord Ave., Belmont, Ma. 02178. *
62.	New England Journal Medicine.	2721	10 Shattuck St., Boston, Ma. 02115.
63	Pandick Press Inc., N.E. Div.,	2721	53 State St., Boston, Ma. 02109.
64.	Register Publications Inc.	2721	50 Hunt Street, Watertown, Ma. 02172.
65.	Want Advertiser Inc.	2721	740 Boston Post Road, Sudbury, Ma. 01776.

METRO BOSTON AQCR - VOC MAILING LIST/ 3

66.	Wellesley Press Inc.	2721	190 Fountain St., Framingham, Ma. 01701.
67.	Alpine Press Inc.	2732	1 Alpine Drive, Braintree, Ma. 02184.
68.	Canton Samples Inc.	2732	5 Dan Road, Canton, Ma. 02021.
69.	Semline Inc.	2732	180 Wood Road, Braintree, Ma. 02184.
70.	Acme Printing Co. Inc.	2751	4 Colby Street, Medford, Ma. 02155.
71.	Alden Press Inc.	2751	217 Friend St., Boston, Ma. 02114.
72.	Andrews, WE, Co. Inc.	2751	140 South Road, Bedford, Ma. 01730.
73.	Apahouser Corp of N. England.	2751	101 Walnut St., Watertown, Ma. 02172.
74.	AVCO Corp.	2751	188 Geneva Ave., Boston, Ma. 02121.
75.	Barney Rabin Co.Inc.	2751	14 Central St., Marblehead, Ma. 01945.
76.	Bowne of Boston Inc.	2751	411 D. Street, Boston, Ma. 02119.
77.	Consolidated Graphics Corp.	2751	330 Resevoir St., Needham, Ma. 02192.
78.	Crawford Press Inc.	2751	47 Pleasant Ave., Brockton, Ma. 02401.
79.	Daniels Printing Co.	2751	40 Commercial St., Everett, Ma. 02149.
80.	Fidelity Press Inc.	2751	2401 Revere Beach Pkwy, Everett, Ma. 02149.
81.	Globe Ticket Co. Inc.	2751	New Boston St., Woburn, Ma. 01801.
82.	Grafacon Inc.	2751	Kane Industrial Park, Hudson, Ma. 01749.
83.	Hanson Printing Co.	2751	200 Montello St., Brockton, Ma. 02403.
84.	Henry N. Sawyer Co. Inc.	2751	394 Atlantic Ave., Boston, Ma. 02210.
85.	New England Lithograph.	2751	927 Melcher St., Boston, Ma. 02210.
86.	The Regal Press Inc.	2751	601 Pleasant St., Norwood, Ma. 02062.
87.	Relief Printin Corp.	2751	443 Albany St., Boston, Ma. 02118.
88.	TADCO Manufacturing Inc.	2751	Pooles Lane, Rockport, Ma. 01966.
89.	US Banknote Corp.	2751	316 Summer St., Boston, Ma. 02210.
90.	Beatrice Food Co.	2821	730 Main St., Wilmington, Ma. 01887.
91.	Beatrice Food Co.	2821	One Corwin St., Peabody, Ma. 01960.
92.	BF Goodrich Co.	2821	Route 128, Exit 13, Gloucester, Ma. 01930.
93.	Chemical Development Corp.	2821	Endicott St., Danvers, Ma. 01923.
94.	Emerson & Cuming Inc.	2821	59 Walpole St., Canton, Ma. 02021.
95.	Emerson & Cuming Inc.	2821	869 Washinton St. Canton, Ma.02021. *
96.	Lynn Plastics Corp.	2821	92 Brookline St., Lynn, Ma.01902.
97.	Wellman Inc.	2824	75 Federal St., Boston, Ma.02110.
98.	Beatrice Food Co.	2842	11 Corwin St., Peabody, Ma. 01960.
99.	Beatrice Food Co.	2842	26 Howley St. Peabody, Ma. 01960.

100. Quinn KJ, & Co., Inc.
101. Cadillac Paint
102. Carpenter Morton
103. Marson Corporation
104. Stahl Finishing
105. Surface Coatings Inc.
106. Touraine Paints Inc.
107. Dodge Chemical Co. Inc.
108. Bemis Associates Inc.
109. Breco, N.Y.
110. Dennison Manufacturing
112. American Mutual Corp.
113. Trumbull Asphalt Co.
114. Easter Products Co. Ins.
115. Lloyd A. Fry Roofing.
116. Tops Donit Inc.
117. Triram Corp
118. Essex Chemical Corp
119. Eltra Corp. Converse Rubber Div.
120. Irving B. Moore Corp.
121. Avon Sole Co.
122. Atlas Corp, Brockton Sole & Plastic Div.
123. BASF Wyandotte Corp.
124. Bellofram Corp.
125. Bextic Inc.
126. Century Products Inc.
127. Data Packaging Corp.
128. Granet Corp.
129. Litton Industrial Products.
130. Rogers Foam Corp.
131. Spirit Inc.
132. US Plastics Corp.
133. Hawthorne Tanneries
134. Fenton Shoe

2842 195-209 Canal Street, Malden, Ma. 02148.
2851 156 Western Boston, Ma. 02134.
2851 328 Third St., Everett, Ma. 02149.
2851 130 Crescent Ave., Chelsea, Ma. 02150.
2851 Carwin St., Peabody, Ma. 01960.
2851 100 Eames St., Wilmington, Ma. 01887.
2851 1760 Revere Beach Pkwy, Everett, Ma. 02149.
2869 165 Rindge Ave., Ext., Cambridge, Ma. 02140.
2891 294 Pleasant St., Watertown, Ma. 02172.
2891 134 Cross St., Winchester, Ma. 01890.
2891 275 Wyman St., Waltham, Ma. 02154.
2911 Quannapowitt Pkwy, Wakefield, Ma. 01880.
2911 Waverly St., Waltham, Ma. 02154.
2951 Hoosac Pier 1, Boston, Ma. 02129.
2951 Waverly & Hollis Sts., Waltham, Ma. 02154.
2951 795 Main St., Cambridge, Ma. 02139.
2951 721 Waverly St., Framingham, Ma. 01701.
2952 58A & 59 Pulaski St., Peabody, Ma. 01960.
3021 392 Pearl St., Malden, Ma. 02148.
3041 30 Ringe Ave. Exit, Cambridge, Ma/ 02140.
3069 E. High St., Holbrook. Ma.
3079 53 Spark Street, Brockton. Ma. 02403.
3079 50 Middlesex Turnpike, Bedford, Ma. 01730.
3079 36 Blanchard Road, Burlington, Ma. 01803.
3079 Superior Drive, Natick, Ma. 01760.
3079 Washington St., Somerville, Ma. 02145.
3079 205 Broadway, Cambridge, Ma. 02139.
3079 25 Loring Dr., Framingham, Ma. 01701.
3079 100 Industrial Park Road, Hingham, Ma. 02043.
3079 114 Central St., Somerville, Ma. 02145.
3079 11 Lake Street, Wakefield, Ma. 01880.
3079 161 Pleasant St., Lynn, Ma. 01901.
3111 18 Goodhue St., Salem, Ma. 01970.
3143 129 Franklin St., Cambridge, Ma. 02139.

METRO BOSTON AQCR - VOC MAILING LIST/ 5

135. Barry Mfg., Co. Inc.	3149	50 Marshall's Wharf, Lynn, Ma. 01901.
136. Footjoy Inc.	3149	144 Field St., Brockton, Ma. 02403.
137. Hyde Athletic Ind. Inc.	3149	432 Columbia St., Cambridge, Ma. 02141.
138. Wright, E.T, & Co. Inc.	3149	379 Liberty St., Rockland, Ma. 02370.
139. Boston Insulated Wire	3357	63 Bay St., Boston, Ma. 02125.
140. Etra Corp	3357	43 Broad Street, Hudson, Ma. 01749.
141. Magnesium Casting	3369	98 Business St., Boston, Ma. 02136.
142. HK Porter Inc.	3423	74 Foley St., Somerville, Ma. 02143.
143. Rexnord Inc (Knife Div).	3423	Powder Mill Road, Maynard, Ma. 01754.
144. Hudson Lock Inc.	3429	Apsley St., Hudson, Ma. 01749.
145. Knox-North Shore Cutting Die	3429	Garden Street, Danvers, Ma. 01923.
146. Merriman Inc,	3429	100 Industrial Park, Hingham, Ma. 02043.
147. L. Antonilli Iron Works	3441	177 Willard, Quincy, Ma. 02169.
148. Massachusetts Engineer	3443	Bodwell Street, Avon, Ma/ 02322.
149. Donnely Mfg.	3444	580 Winter St. Waltham, Ma. 02154.
150. Cambridge Screw Co. Inc.	3451	100 Foley Street, Somerville, Ma. 02145.
151. FC Phillips Inc.	3451	471 Washington St., Staughton, Ma. 02072.
152. George W. Moore Inc.	3451	100 Beaver Street, Waltham, Ma. 02154.
153. Walworth Co.	3452	1515 Washington St., Braintree, Ma. 02184.
154. Eastern Tool & Stamping Co. Inc.	3469	109 Ballard Street, Saugus, Ma. 01906.
155. Fraen Corp.	3469	338 Main Street, Wakefield, Ma. 01880.
156. Modern Die & Machine Co.	3469	166 Pleasant Street, Boston, Ma/ 02125.
157. Nuclear Metals Inc.	3469	2229 Main Street, Concord, Ma. 01742.
158. Sexton Can Co. Inc.	3469	31 Cross Street, Everett, Ma. 02149.
159. USM Corp., Whitman Metal Stamping Div.	3469	56 Warren Ave., Whitman, Ma. 02382.
160. Winn JH, Inc.	3469	620 Washington St., Winchester, Ma. 01890.
161. Modern Electroplating	3471	2430 Washington St., Boston, Ma. 02119.
162. Systems Engineering & Mfg. Corp.	3471	Campanelli Pkwy, Stoughton, Ma. 02072.
163. Duncan Galvanizing Corp.	3479	69 Norman St., Everett, Ma. 02149.
164. Richard A. Klein Co.	3496	349 Lenox, Norwood, Ma. 02062.
165. Carr Company.	3499	495 Watertown St., Newton, Ma. 02160.
166. Raytheon Company	3499	Harwell Road, Bedford, Ma. 01730.
167. Pneumatic Scale Corp.	3551	65 Newport Ave., Quincy, Ma. 02171.
168. Gloucester Engineering Co. Inc.	3559	Blackburn Industrial Park, Gloucester, Ma. 01930.

METRO BOSTON AQCR- VOC MAILING LIST/ 6

169. USM Corporation	3559	181 Elliot Street, Beverly, Ma/ 01915.
170. Westinghouse Electric Sturterant	3564	6 Damon Street, Boston, Ma. 02136.
171. Incom International Inc. Div. Boston Gear Works	3566	14 Hayward Street, Quincy, Ma. 02171.
172. Bird Machine Co. Inc.	3569	Neponset St., South Walpole, Ma. 02071.
173. Crane Packing Co.	3569	15 Industrial Park Rd., Hingham, Ma. 02043.
174. Millpore Corp.	3569	Ashby Road, Bedford, Ma. 01730.
175. Data General Corp.	3573	Route 9 and 495, Southboro, Ma. 01772.
176. Digital Equipment Corp.	3573	200 Forest St., Marlboro, Ma. 01752.
177. Digital Equipment Corp.	3573	146 Main St., Maynard, Ma. 01754.
178. Honeywell Information Systems	3573	38 Life Street, Boston, Ma. 02135.
179. Honeywell Information Systems.	3573	200 Smith Street, Waltham, Ma. 02154.
180. Honeywell Information Systems.	3573	70 Walnut Street, Wellesley, Ma. 02181.
181. Inforex Inc.	3573	21 North Avenue, Burlington, Ma. 01803.
182. Raytheon Co.	3573	H15 Boston/Providence Tpk., Norwood, Ma. 02062
183. Ark-les Switch Corp.	3643	51 Water Street, Watertown, Ma. 02172.
184. Microwave Assoc.	3662	43 Sputh Burlington, Ma. 01803.
185. Ainslee Corp.	3679	531 Pond Street, Braintree, Ma. 02184.
186. Cambridge Thermionic.	3679	445 Concord Ave., Cambridge, Ma. 02138.
187. Damon Corp.	3679	300 Second Ave., Needham, Ma. 02192.
188. Dynamics Research Corp.	3679	50-60 Concord St., Wilmington, Ma. 01887.
189. EG & G Inc. Elec. Prod. Div.	3679	35 Congress Street, Salem, Ma. 01970.
190. ITEK Corp. Optical Systems Div.	3679	3rd Avenue, Burlington, Ma. 01803.
191. Raytheon Co.	3679	20 Seyon Street, Waltham, Ma. 02154.
192. RCA Aerospace	3679	Rts. 3 & 62 Burlington, Ma. 01803.
193. Industraial Cab Co. Inc.	3713	Western Ave., Essex, Ma. 01929.
194. James A. Kiley Co. Inc.	3713	15 Linwood Street, Somerville, Ma. 02145.
195. Morse Body Mfg. Co. Inc. Morse Body Truck Div.	3713	69-75 Hovard Street, Watertown, Ma. 02172.
196. Walsh Body & Trailer Corp.	3713	Prospect St., Somerville, Ma. 02143.
197. ARO Manufacturing Co. Inc.	3714	191-197 Webster St., Newton, Ma. 02165.
198. Beacon Auto Radiator Co. Inc.	3714	110 Brookline Ave., Boston, Ma. 02215.
199. Beverly Mfg. Co.	3714	200 Rantoul St., Beverly, Ma. 01915.
200. Hampden Automobile Mfg. Co. Samsom Auto. Products.	3714	123 Heath St., Boston. Ma. 02130.
201. International Mfg, Co.	3714	2500 Washington Street, Boston, Ma. 02119.
202. Malden Brake Inc.	3714	448 Eastern Ave., Malden, Ma. 02148.

METRO BOSTON AQCR - VOC MAILING LIST/7

203. Precision Motor Rebuilders	3714	460 Somerville Ave., Somerville, Ma. 02143.
204. Bromfield Corp.	3731.	246 Border St., Boston, Ma. 02128.
205. Munro Drydock Inc.	3731	2 Winnisiment St., Chelsea, Ma. 02150.
206. Cape Dory Yachts Inc.	3732	373 Crescent St., W. Bridgewater, Ma. 02379.
207. Little Harbour Boat Yard Corp.	3732	Little Harbour Way, Marblehead, Ma. 01945.
208. SS Crocker, Jnr.	3732	Ashland Ave., Manchester, Ma. 01944.
209. United Electric Control	3823	85 School Ave., Watertown, Ma. 02172.
210. Genrad Inc. Environment Div.	3825	Route 117, Bolton, Ma. 01740.
211. Krohn Hite Corp.	3825	Bodwell St., Avon, Ma. 02322.
212. Block Engineering Inc.	3832	19 Blackstone St., Cambridge, Ma. 02139.
213. Fisher-scientific Co.	3832	590 Lincoln Street, Waltham, Ma. 02154.
214. Stocker & Yale Inc. Jarrell-Ask Div.	3832	Rt. 128 & Brimbal Beverly, Ma. 01915.
215. Polaroid Corp.	3861	122o Ames Street, Cambridge, Ma. 02142.
216. Infrared Industries Inc.	3861	62 Fourth Ave., Waltham, Ma. 02154.
217. Leonard Silver International	3914	144 Addison St. Boston, Ma. 02128.
218. Carr Co.	3964	195 Binney St., Cambridge, Ma. 02139.
219. LH Dalo Inc.	7216	11 Humphreys Street, Boston, Ma. 02125.
220. Shea Dry Cleaners Inc.	7216	1016 Mass. Ave., Cambridge, Ma. 02138.
221. National Uniform Co.	7216	80 E. Cottage, Boston, Ma. 02118.
222. Lawson Coin Wash	7216	229 N. Main Street, Natick, Ma. 01760.
223. 225 South Side Dye House.	7216	173 B Norfolk Ave., Boston, Ma. 02119.
224. Wallex Cleaners	7216	874 Lexington, Waltham, Ma. 02154.
225. Walker Ms. Inc.	2085	35 Wareham Street, Boston, Ma. 02118.
226. Ace Textiles Inc.	2261	90 Wareham Street, Boston, Ma. 02118.
227. Adams Sponging Co.	2261	90 Wareham Street, Boston, Ma. 02118.
228. Burg AS & Co.	2261	53 Mason Street, Salem, Ma. 01970.
229. Lauren Joyce Inc.	2261	23 Beach Street, Boston, Ma. 02111.
230. Eastern Process Co. Inc.	2261	2 Churchill Road, Hingham, Ma. 02043.
231. News Publishing Co.	2711	375 Cochituated Road, Framingham, Ma. 01701.
232. Addison-Wstley Publishing Co.	2731	Jacob Way, Reading, Ma. 01867.
233. Allyn & Bacon Inc.	2731	470 Atlantic Ave., Boston, Ma. 02210.
234. Field Enterprises Educational	2731	1 Washington Street, Wellesley, Ma. 02181.
235. Halliday Lithographic	2731	Circuit Street, West Hanover, Ma. o2339.
236. Houghyon-Mifflin Co.	2731	One Beacon St., Boston, Ma. 02107.

237. Lithographic Publications	2731	18 Spencer St., Stoneham, Ma. 02180.
238. Little Brown & Co.	2731	34 Bacon Street, Boston, Ma/ 02108.
239. McGraw-Hill Inc. FW Dodge Div.	2731	31 St. James Ave., Boston, Ma. 02116.
240. Warren Gorham & Lamont Inc.	2731	210 South St., Boston, Ma. 02111.
241. Xerox Corp.	2731	121 Spring Street, Lexington, Ma. 02173.
242. Bailey Press Inc.	2751	Causeway Street, Boston, Ma. 02114.
243. Dowchex Inc.	2751	98 Westgate Drive, Brockton, Ma. 02401.
244. Harland, JH, Co.	2751	201 Union Street, Rockland, Ma. 02370.
245. Lorell Inc.	2751	Bodwell Street, Avon, Ma. 02322.
246. Metcalf Co. Inc.	2751	51 Melcher Street, Boston, Ma. 02210.
247. National Press Corp.	2751	251 Causeway Street, Boston, Ma. 02114.
248. Camera Stat Assoc. Inc.	2752	309 Great Road, Bedford, Ma. 01730.
249. Clark-Franklin-Kingston Press	2752	582 E. Street, Boston, Ma. 02210.
250. Colourpicture Publishers Inc.	2752	76 Atherton Street. Boston, Ma. 02130.
251. Dean, GH, Company.	2752	645 Summer Street, Boston, Ma. 02110.
252. Dickinson Advertising Inc.	2752	67 Federal Ave., Quincy, Ma. 02169.
253. Harwich Lithograph.	2752	1205 Hyde Park Ave., Boston, Ma. 02136.
254. House of Offset Inc.	2752	41 Innerbelt Road, Somerville, Ma. 02143.
255. Mark Burton Inc.	2752	300 Summer St., Boston, Ma. 02210.
256. Nimrod Press Inc.	2752	170 Brookline Ave., Boston, Ma. 02210.
257. Regal Lithograph Co. Inc.	2752	259 A Street, Boston, Ma. 02210.
258. Semco Industries Inc.	2752	90 Howes Way, Stoughton, Ma. 02072.
259. Semline Inc., Spaulding-Moss Westwood Div.	2752	270 University Ave., Westwood, Ma. 02090.
260. Spalding Co. Inc. Custom Graphic Div.	2752	283 Summer Street, Boston, Ma. 02210.
261. Winthrop Printing & Offset Co.	2752	235 Old Colony Ave., Boston, Ma. 02127.
262. Rust Craft Greeting Cards Inc.	2771	Rust Craft Park, Dedham, Ma. 02026.
263. Delux Check Printers Inc.	2782	125 Newbury St., Framingham, Ma. 01701.
264. ATI Inc. Armstrong Lab. Div.	2844	423 La Grange St., Boston, Ma. 02132.
265. Pharmasol Corp.	2844	61 Pleasant Street, Randolph, Ma. 02368.
266. Creesc & Cook Co.	3111	33 Water St., Danvers, Ma. 01923.
267. National Tanning & Trading	3111	Webster Street, Peabody, Ma. 01960.
268. Eagle Can Co.	3411	Peabody Industrial Park, Peabody, Ma. 01960.
269. New Can. Co. Inc.	3411	1 Mear Road, Holbrook, Ma. 02343.

METRO BOSTON AQCR-VOC MAILING LIST/9

270.	Mobil Oil	5171	279 Maple Street, Marlboro, Ma. 01752.
271.	Hoppy's Oil Service	5172	1200 Montello Street, Brockton, Ma. 02401.
272.	Pocahanta's Fuel Co. Inc.	5172	211 Derby Street, Salem, Ma. 01970.
273.	Anderson & Son Cleaning	7216	49 Wellington Hill, Boston, Ma. 02126.
274.	C & C Inc. of Framingham	7216	530 Union Avenue, Framingham, Ma. 01701.
275.	Craft Cleaners Inc.	7216	1707 Mass. Ave., Lexington, Ma. 02173.
276.	Doms Cleaners Inc.	7216	169 Commonwealth Ave., Wayland, Ma. 01778.
277.	Ideal Dry Cleaners Inc.	7216	6 Baldwin Street, Lynn, Ma. 01902.
286.	R & H Discount Cleaners	7216	348 N. Main Street, Randolph, Ma. 02368.
287.	Sarni Cleaners of Framingham	7216	Nicholas Road, Framingham, Ma. 01701.
288.	Sarni Cleaners of Mass. Ave., Inc.	7216	161 Mass Avenue, Boston, Ma. 02115.

APPENDIX B

SURVEY PACKAGE

DAVID STANDLEY
Commissioner
727-5194

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Metropolitan Boston - Northeast Region
600 Washington Street, Boston, Ma. 02111

June 22, 1978

Gentlemen:

The Division of Air and Hazardous Materials must develop regulations limiting the quantities of volatile organic compounds emitted from sources in the Commonwealth in order to achieve compliance with the photochemical oxidant standard as required by the Federal Clean Air Act Amendments of 1977.

It is the Division's desire to develop regulations that will provide for the necessary reduction in volatile organic compound emissions without imposing undue economic hardship on the industries in the Commonwealth utilizing these compounds. Toward this end, the Metropolitan Boston Region must update its inventory of commercial and industrial facilities within the Region to determine the types and quantities of volatile organic compounds presently being emitted.

The Region has determined that the nature of operations at your facility may involve the use of volatile organic compounds. Regulation 310 CMR 7.12, Registration, Record Keeping, and Reporting, requires that you complete the enclosed inventory form and return it. Failure to meet this requirement will result in the Department initiating appropriate legal action to obtain this information.

You are requested to return the form within thirty (30) days. If you have any questions or need assistance, please do not hesitate to call Donald Squires, Senior Air Pollution Control Engineer, telephone number 727-4609. The Commonwealth is being assisted by Engineering Sciences of McLean, Virginia in completing this inventory. You may be contacted by them to clarify information submitted.

Thank you in advance for your cooperation.

Very truly yours,

John A. Desmond

John A. Desmond
Chief
Air Quality Control Section

D/Ect

Enclosure

INSTRUCTIONS

Everyone receiving this form should complete the first page and only those other sections pertaining to their company.

The information submitted should pertain to calendar year 1977 operations.

If the space provided is not adequate, feel free to either copy the form, use a separate sheet or request an additional copy.

Information contained in the Division's files is available to the general public upon request under the provisions of the Freedom of Information Act. Contact the Division (727-4609) immediately if you feel that completion of information requested would compromise proprietary data.

Please specify units for all information given. (Try to use the most common units for your industry.)

Please use the same source number for a process(es) and its (their) corresponding stack(s) or vent(s).

Control Devices refers only to that equipment used to reduce hydrocarbon emissions (ex. condensers, incinerators.)

If the Reid vapor pressure of a product is not available, please submit the true vapor pressure in pounds per square inch absolute (psia).

Unless a storage or process substance is readily identifiable by its trade name (ex. Freon 113), please list its composition.

When determining emissions from manufacturing operations, indicate the method used in arriving at the figure given. A material balance, use of an EPA emission factor, or a recent stack test are the preferred determination methods.

Please be sure to provide the densities for all liquids containing volatiles that are used. Densities should correspond to the conditions at which the quantity used was determined.

Please supply as much specific information as possible to enable accurate calculations to be made and an accurate survey to be conducted.

Please also indicate if you have substituted compounds or installed control equipment in order to comply with the provisions of existing regulations.

Please supply a schematic of your facility indicating the location of all stacks and vents that emit volatile organic compounds. Also, include a short narrative describing operations at this facility.

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING
DIVISION OF AIR AND HAZARDOUS MATERIALS

FORM FOR THE REGISTRATION OF HYDROCARBON EMISSIONS

Please complete and return this form to the Metropolitan Boston Air Quality Control Region, Room 320, 600 Washington Street, Boston, MA. 02111. Should you have any questions, call 727-4609, 5195.

Company Name_____

Plant Address_____

Mailing Address_____

Contact_____Title_____

Telephone Number_____

Approximate number of employees at this plant address_____

Normal operating schedule of this facility____hr/day _____days/wk. _____wk/yr.

Indicate the percentage of annual production produced per quarter:

First_____Second_____Third_____Fourth_____

CERTIFICATION to be signed by responsible corporate official: I certify that I have examined the information on this form and that, to the best of my knowledge, it is true and complete.

Signed_____ Date_____

Title_____

How many gallons of material containing volatile hydrocarbons, such as cleaning fluids, fuels, coatings, adhesives, inks, or solvents, are purchased by this facility annually? _____

SUPPLIER	ADDRESS OF SUPPLIER	TYPE OF MATERIALS	QUANTITY PURCHASED	DENSITY OF MATERIAL

STACK INFORMATION AND HYDROCARBON CONTROL INFORMATION

Complete the table below for all stacks which exhaust volatile organic compounds and for all hydrocarbon collection equipment. Number the sources to agree with data submitted on the following pages of this form.

Stack data need not be submitted for stacks which do not emit hydrocarbons.

Source Number	Process or Operation	Type of Process Equipment	No. of Units	HYDROCARBON CONTROL EQUIPMENT		STACK INFORMATION				
				Type of Control Device	Estimated Control Efficiency	Exit Ht. Above Grnd.(ft)	Inside Dia. (ft)	Temp (°F)	Exhaust Flowrate (cfm)	Stack Exit Velocity (ft/sec)

SURFACE COATING

Complete this sheet for all painting, printing, treating or coating of paper, metals, fabric, etc., in which hydrocarbons are used. Should additional space be needed for reporting, submit addendum.

Source Number	Material Being Coated	Estimated Amount of Material Coated Annually	Coating Method Used	Type of Coating Applied	Amount of Coating Applied per Year (Pounds or Gallons)

SURFACE COATING (Continued)

Source Number	Temperature At Which Coating Is Applied or Cured	Type of Solvent In Undiluted Coating	Wt. Solvent In Undiluted Coating (lb/gal)	Type of Solvent Added to Coating	Amount of Solvent Added Per Year (Pounds or Gallons)

How much, if any, solvent is shipped out for recovery or disposal?_____gal/year.

What type(s) of cleaning solvent is(are) used?_____

How much cleaning solvent is used per year?_____

CLEANING, DEGREASING AND/OR DRYCLEANING

Complete this page for operations such as cold solvent cleaning, hot solvent cleaning, and vapor degreasing. Stoddard solvent, 1,1,1 trichloroethane, perchloroethylene, methylene chloride, and trichloroethylene are examples of solvents that must be reported.

Source Number	Operation	Type of Material Treated	Pounds of Material Treated Annually	Type of Solvent Used	Gallons Used Annually

Source Number	Temperature of Solvent In Use (°F)	Type of Emission Control Device	Estimated Control Efficiency	Waste Solvent Disposal Method	Gallons of Solvent Disposed of Annually

MANUFACTURING

Complete the sheet for all operations which utilize hydrocarbons as a raw material or which produce an end product containing hydrocarbons.

Brief Description of Process _____

Source Number	Process or Operation Using Hydrocarbons	Type of Material Processed	Annual Process Throughput	Type and Weight of Volatile Hydrocarbons In Processed Material	Quantity of Volatile Hydrocarbons Lost of Atmosphere During Processing (lbs/yr)	Method Used To Determine Emission (emission factor or material balance)

STORAGE TANK DATA
TANK CHARACTERISTICS, PRODUCT AND EMISSIONS INFORMATION

1. INTERNAL ID CODE FOR STORAGE TANK UNIT	5. TANK CHARACTERISTICS (See Below)									6. PRODUCT STORED	7. PRODUCT CHARACTERISTICS					8. TANK EMISSIONS		
	a. LOCATION	b. FILL METH	c. ROOF TYPE	d. SEAL TYPE	e. SEAL COND	f. SHELL CONST	g. ROOF COLOR	h. SHELL COLOR	i. PAINT COND		a. VAPOR DENSITY (lbs/gal)	b. VAPOR MOLE WT (lbs/mole)	c. REID VAPOR PRESSURE (psia)	d. STORAGE TEMP (°F) Normal	Maximum	a. AMOUNT Normal	Maximum	b. ESTIMATION METHOD

9. AVG AMBIENT TEMPERATURE (°F)

10. AVG DIURNAL TEMP CHANGE (°F)

11. AVG WIND VELOCITY (mph)

5. TANK CHARACTERISTICS Enter one of the choices provided, if space permits, or the characters shown to the left of the choice. If another response is more appropriate, enter it or an abbreviation. When the latter is used, define the abbreviation below.

a. LOCATION
ABV-above ground
UND-underground

b. FILL METH
SUB-submerged
SPL-splash
BLD-bottom loading

c. ROOF TYPE
1-fixed
2-floating pan
3-floating pontoon
4-floating double deck
5-variable vapor space
6-pressurized

d. SEAL TYPE
S-single
D-double

e. SEAL CONDITION
T-tight
L-loose (includes pre 1942 seals)

f. SHELL CONSTRUCTION
RIV-riveted
WELD-welded
GUN-gunite
EPOX-epoxy coated rivets

i. PAINT CONDITION
G-good
P-poor

8b. EMISSION ESTIMATION METHOD
Method used for determination of emission data.

Enter:
1-Source Test
2-Material Balance
3-EPA Emission Factor
4-Other Emission Factor (Specify)
5-Other (Specify)

APPENDIX C

REFERENCES

APPENDIX C

REFERENCES FOR DETERMINING PHYSICAL PROPERTIES OF PROCESS CONSTITUENTS

1. "Compilation of Air Pollutant Emission Factors." U. S. Environmental Protection Agency Document, AP-42, Supplement 8, May 1978.

2. Perry, John H., Chemical Engineers Handbook. New York: McGraw-Hill Co., 1963.

3. "Physical Properties of Common Petrochemical Compounds." American Petroleum Industry Bulletin, No. 2523, Nov. 1969, Appendix I.

4. Shreve, R. Norris, Chemical Process Industries. New York: McGraw-Hill Co., 1967.

5. Weast, Robert C., Ph.D., Handbook of Chemistry and Physics. Cleveland, Ohio, The Chemical Rubber Co., 1971.